

What is claimed is:

1. A disk storage apparatus comprising:

an actuator for positioning a head with respect to a disk;

a drive section for driving said actuator;

5 a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

10 a position control section for producing position control information corresponding to the position error information by said position detection section;

a voltage detection section for detecting a voltage generated in driving said actuator and outputting a voltage signal;

15 a disturbance estimation section for estimating the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and a drive signal from said drive section, and producing disturbance estimation information;

20 a correction section for correcting the position control information by said position control section with the disturbance estimation information by said disturbance estimation section and producing said drive signal; and

25 a disturbance monitor section for monitoring the disturbance estimation information by said disturbance estimation section, and prohibiting a record by said head if said disturbance estimation information exceeds an allowable range.

30 2. The disk storage apparatus as set forth in claim 1, wherein

said disturbance estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the drive signal from said drive section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

5 a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the added value of the output of said second multiplication section and the output of said first integration section from the output of said first multiplication section, and

10 said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section.

15 3. The disk storage apparatus as set forth in claim 1, wherein the control band of said disturbance estimation section is set at a value larger than the control band of said position control section.

20 4. A disk storage apparatus comprising:  
an actuator for positioning a head with respect to a disk;  
a drive section for driving said actuator;  
a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on  
25 said disk and is detected by said head;

a position control section for producing position control information corresponding to the position error information by said position detection section;

30 a voltage detection section for detecting a voltage generated in driving said actuator and outputting a voltage signal;

a disturbance estimation section for estimating the

magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and the position control information by said position control section, and producing disturbance estimation information;

5           a correction section for correcting the position control information by said position control section with the disturbance estimation information by said disturbance estimation section and producing said drive signal; and

10           a disturbance monitor section for monitoring the disturbance estimation information by said disturbance estimation section, and prohibiting a record by said head if said disturbance estimation information exceeds an allowable range.

15           5. The disk storage apparatus as set forth in claim 3, wherein

          said disturbance estimation section includes:

          a comparison section for receiving the voltage signal detected by said voltage detection section;

20           a first multiplication section for multiplying the position control information from position control section by a first coefficient;

          a second multiplication section for multiplying the output of said comparison section by a second coefficient;

25           a first integration section for integrating the output of said comparison section; and

          a second integration section for integrating a value obtained by subtracting the output of said second multiplication section from the output of said first multiplication section, and

30           said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section.

6. The disk storage apparatus as set forth in claim 3, wherein the control band of said disturbance estimation section is set at a value larger than the control band of said position control section.

5 7. A disk storage apparatus comprising:

an actuator for positioning a head with respect to a disk;

a drive section for driving said actuator;

a voltage detection section for detecting a voltage generated in driving said actuator, and outputting a voltage signal;

a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

15 a velocity/disturbance estimation section for estimating a head moving velocity and the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and from a drive signal in said drive section, and producing velocity estimation information and disturbance estimation information;

20 a position control section for producing position control information corresponding in principle to the position error information by said position detection section and adding the velocity estimation information by said velocity/disturbance estimation section to said position error information according to conditions to produce position control information;

25 a correction section for correcting the position control information by said position control section with the disturbance estimation information by said velocity/disturbance estimation section and producing said drive signal; and

30 a disturbance monitor section for monitoring the disturbance estimation information by said

velocity/disturbance estimation section and when said disturbance estimation information exceeds an allowable range, making valid said velocity estimation information with respect to said position error information in said position control section.

8. The disk storage apparatus as set forth in claim 7, wherein

said velocity/disturbance estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the drive signal from said drive section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the added value of the output of said second multiplication section and the output of said first integration section from the output of said first multiplication section,

said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section, and

said second integration section produces said velocity estimation information therein.

9. The disk storage apparatus as set forth in claim 7, wherein the control band of said velocity/disturbance estimation section is set at a value larger than the control band of said position control section.

10. A disk storage apparatus comprising:

an actuator for positioning a head with respect to a disk;

a drive section for receiving position control information and driving said actuator;

a voltage detection section for detecting a voltage generated in driving said actuator, and outputting a voltage  
5 signal;

a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

10 a velocity/disturbance estimation section for estimating a head moving velocity and the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and from a drive signal in said drive section, and producing velocity estimation information and disturbance  
15 estimation information;

a position control section for producing position control information corresponding in principle to the position error information by said position detection section and adding the velocity estimation information by said velocity/disturbance  
20 estimation section to said position error information according to conditions to produce position control information; and

a disturbance monitor section for monitoring the disturbance estimation information by said  
velocity/disturbance estimation section and when said  
25 disturbance estimation information exceeds an allowable range, making valid said velocity estimation information with respect to said position error information in said position control section, wherein

said drive signal is obtained based on the position  
30 control information by said position control section.

11. The disk storage apparatus as set forth in claim 10, wherein

said velocity/disturbance estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the drive signal from said drive section by a first coefficient;

5 a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

10 a second integration section for integrating a value obtained by subtracting the added value of the output of said second multiplication section and the output of said first integration section from the output of said first multiplication section, and

15 said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section.

20 12. The disk storage apparatus as set forth in claim 10, wherein the control band of said velocity/disturbance estimation section is set at a value larger than the control band of said position control section.

13. A disk storage apparatus comprising:

an actuator for positioning a head with respect to a disk;

a drive section for driving said actuator;

25 a voltage detection section for detecting a voltage generated in driving said actuator, and outputting a voltage signal;

30 a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

a velocity/disturbance estimation section for estimating a head moving velocity and the magnitude of a disturbance

exerted on said head from the voltage signal by said voltage detection section and from position control information by a position control section, and producing velocity estimation information and disturbance estimation information;

5 a position control section for producing position control information corresponding in principle to the position error information by said position detection section and adding the velocity estimation information by said velocity/disturbance estimation section to said position error information according to conditions to produce position control information;

10 a correction section for correcting the position control information by said position control section with the disturbance estimation information by said velocity/disturbance estimation section and producing said drive signal; and

15 a disturbance monitor section for monitoring the disturbance estimation information by said velocity/disturbance estimation section and when said disturbance estimation information exceeds an allowable range, making valid said velocity estimation information with respect to said position error information in said position control section.

20 14. The disk storage apparatus as set forth in claim 13, wherein

25 said velocity/disturbance estimation section includes: a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the position control information from said position control section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output



of said comparison section; and

a second integration section for integrating a value obtained by subtracting the output of said second multiplication section from the output of said first

5 multiplication section,

said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section, and

10 said second integration section produces said velocity estimation information therein.

15 15. The disk storage apparatus as set forth in claim 13, wherein the control band of said velocity/disturbance estimation section is set at a value larger than the control band of said position control section.

16. A disk storage apparatus comprising:

an actuator for positioning a head with respect to a disk;

a drive section for driving said actuator;

a voltage detection section for detecting a voltage

20 generated in driving said actuator, and outputting a voltage signal;

a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on  
25 said disk and is detected by said head;

a position control section for producing position control information corresponding to the position error information by said position detection section;

a velocity/disturbance estimation section for estimating  
30 a head moving velocity and the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and from a drive signal in said drive section, and producing velocity estimation information and disturbance

estimation information;

a correction section for correcting the position control information by said position control section with the disturbance estimation information by said

5 velocity/disturbance estimation section and adding the velocity estimation information by said velocity/disturbance estimation section according to conditions to produce said drive signal; and

10 a disturbance monitor section for monitoring the disturbance estimation information by said velocity/disturbance estimation section and when said disturbance estimation information exceeds an allowable range, making valid said velocity estimation information with respect to said position control information in said correction  
15 section.

17. The disk storage apparatus as set forth in claim 16, wherein

said velocity/disturbance estimation section includes:

20 a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the drive signal from said drive section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

25 a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the added value of the output of said second multiplication section and the output of said first  
30 integration section from the output of said first multiplication section,

said comparison section compares said voltage signal with the output of said second integration section, and outputs the

result to said second multiplication section and said first integration section, and

said second integration section produces said velocity estimation information therein.

5        18. The disk storage apparatus as set forth in claim 16, wherein the control band of said velocity/disturbance estimation section is set at a value larger than the control band of said position control section.

19. A disk storage apparatus comprising:

10        an actuator for positioning a head with respect to a disk;  
      a drive section for driving said actuator;  
      a voltage detection section for detecting a voltage generated in driving said actuator, and outputting a voltage signal;

15        a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

20        a position control section for producing position control information corresponding to the position error information by said position detection section;

25        a velocity/disturbance estimation section for estimating a head moving velocity and the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and from position control information by said position control section, and producing velocity estimation information and disturbance estimation information;

30        a correction section for correcting the position control information by said position control section with the disturbance estimation information by said velocity/disturbance estimation section and adding the velocity estimation information by said velocity/disturbance estimation section according to conditions to produce said

drive signal; and

a disturbance monitor section for monitoring the disturbance estimation information by said velocity/disturbance estimation section and when said disturbance estimation information exceeds an allowable range, making valid said velocity estimation information with respect to said position control information in said correction section.

20. The disk storage apparatus as set forth in claim 19, wherein

said velocity/disturbance estimation section includes:  
a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the position control signal from said position control section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the output of said second multiplication section from the output of said first multiplication section,

said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section, and

said second integration section produces said velocity estimation information therein.

21. The disk storage apparatus as set forth in claim 19, wherein the control band of said velocity/disturbance estimation section is set at a value larger than the control

band of said position control section.